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AGRICULTURE
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Mycorrhizal Synthesis of *Pinus sylvestris* L. and *Fomes annosus* (Fr.) Cke

by

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Presented by K. MAŃKA on April 4, 1970

In the course of investigations on the influence of saprophytic fungal communities of the soil environment on mycorrhizal fungi as well as on selected tree-root pathogenes, carried out according to Professor K. Mańka's proposal, a synthesis of ectotrophic mycorrhiza of *Pinus sylvestris* and *Formes annosus* has been achieved.

A pure *Fomes annosus* culture obtained from a mass isolate of this fungus, from naturally affected pine wood, has been used. The synthesis was performed according to the method of J. Pachlewska [1], in glass tubes 300 × 40 mm provided with an agar medium of the following composition: 15 g of agar-agar, 100 µg of thiamine, 1000 ml of distilled water. Sterilely germinated pine seeds were inserted into this medium, and one month later, when roots of the pine seedlings were already sufficiently developed, the medium was inoculated with *Fomes annosus*. This synthesis experiment was carried out in a growth chamber under controlled conditions characterized by a light intensity of 1820 lux (14 h per day), relative humidity of 85 percent, and a temperature of 24°C.

A month after inoculating the medium with *Fomes annosus* the first three swollen, creame-coloured (with a tint of bronze), forked mycorrhizae appeared. Two weeks later five similarly coloured, smooth, dichotomously branched mycorrhizae were formed in the agar-medium. After a further three-month period (Fig. 1) many solitary and repeatedly dichotomous mycorrhizae were produced, the pine seedlings themselves being completely healthy and satisfactorily developed, similarly as in the case with the control ones. The mycelium penetrated the medium as well as developed over the agar surface. On the surface of shallowly localized mycorrhizae light thread-like mycelial structures were observed, on deeper placed ones none of such structures could be seen. The apical parts of the above-described mycorrhizae were creamy white and somewhat enlarged, showing thus the initiation of a new branching process.

Over the agar surface dichotomous mycorrhizae were also formed, namely of two kinds: 1) smooth ones (i.e. without a fungal mantle) with conidial structures of *F. annosus* growing out of them (Fig. 2); and 2) mycorrhizae with a white fungals mantle (Fig. 2). This mantle was one-layered, prosenchymateous, hyaline, showing

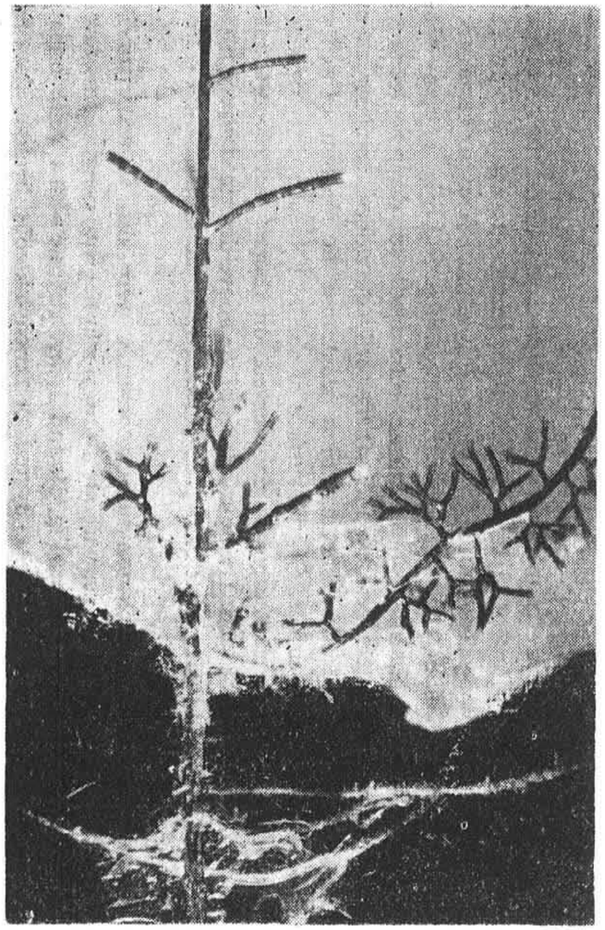

Fig. 1. Mycorrhiza in the agar-medium. ×4

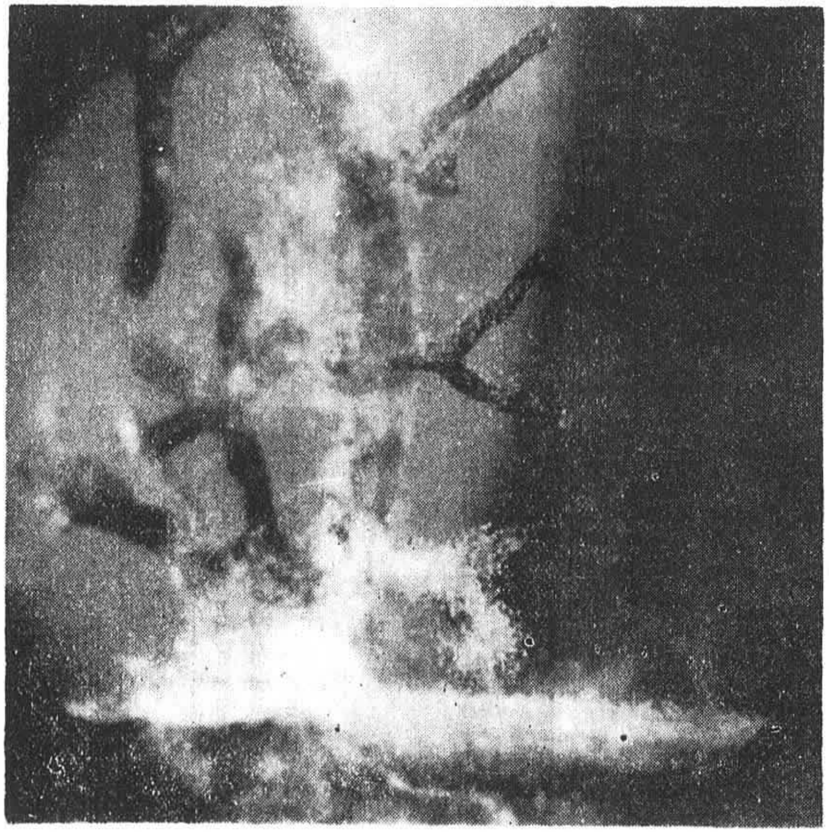

Fig. 2. Mycorrhizae in and above the agar-medium. ×20

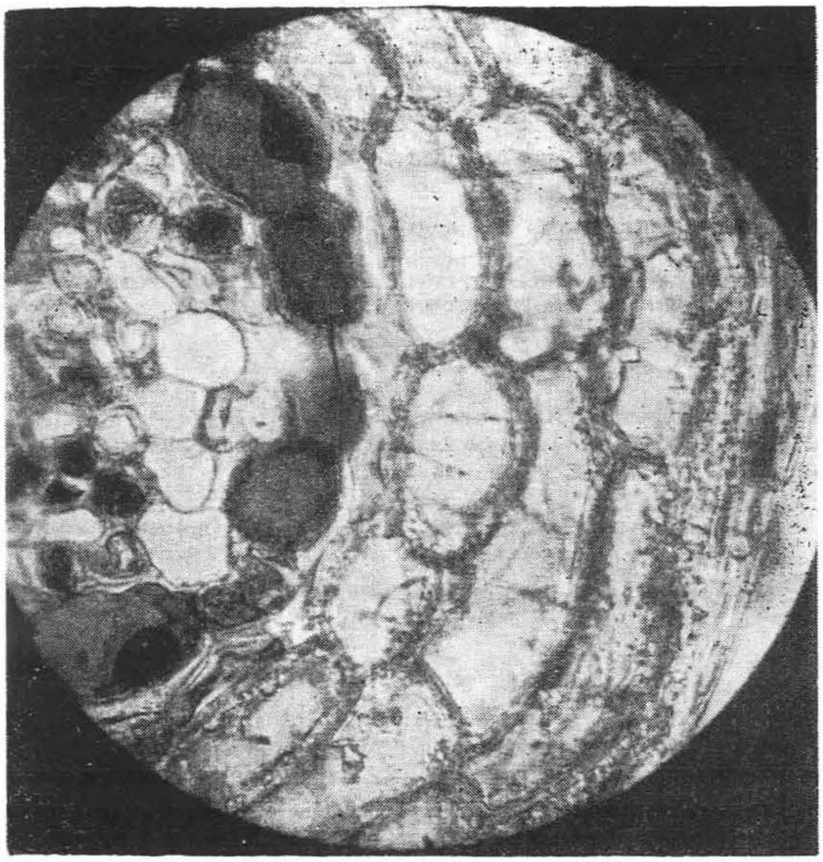

Fig. 3. Cross section of a mycorrhiza form within the agar-medium. ×400

a thickness of 0—44 μ, in the outer part becoming loosened and passing into a kind of synnemata with conidial structures typical of *F. annosus*. The Hartigian net on the cross-sections of the mycorrhizae was slightly but distinctly developed, including the primary cortex down to the endoderm. In some cases individual hyphae crossing cortex cells have been observed, which could be considered as an initial step to the formation of a pseudo-mycorrhizal type of symbiosis. The stele was completely free of any mycelial infection.

A similar picture was observed in the cross-sections of mycorrhizae formed in the agar-medium (Fig. 3), but here the fungal mantle was tighter and showed a thickness of only 0—26 μ. Moreover, the cortex ,cells were more frequently crossed by individual fungal hyphae.

From superficially desinfected mycorrhizae (alcohol treatment) *Fomes annosus* was reisolated easily.

The positive artificial synthesis of an ectotrophic mycorrhiza (with a tendency to transforming into a type of pseudo-mycorrhiza) of *Pinus sylvestris* and *Fomes annosus*, appears to have been achieved for the first time. Hermann [2] was of the opinion that "Der Pilz lebt saprophytisch im Boden, von wo er durch seine Konidien sich der peritrophen Mykorrhiza der Waldbäume angesellt und mit dieser in die Wurzeln der Bäume gelangt". More documented considerations on this subject are given by Orłoś and Dominik [3], who describe a type of peritrophic mycorrhiza of *P. sylvestric* and *F. annosus* obtained in unpublished experiments of J. Zub.

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